Remarks

New claims 15-18 have been added. The new claims correspond to claims 1, 2, 3, and 5, but do not include Hf or Zr in the first metal group. No new matter has been added.

Claims 8-10 and 12 stand rejected under 35 USC 102(e) as being anticipated by Okazaki. This rejection is respectfully traversed. The Examiner states that Okazaki discloses an electrode comprising first, second and third electrode layers. The second electrode layer comprising copper. Claim 8 has been amended to specify that the second electrode layer comprises Ni. Okazaki does not mention or describe a second electrode layer comprising Ni. Since Okazaki fails to disclose all of the limitations of claim 8, the rejection of claim 8 as anticipated by of Okazaki should be withdrawn. The rejections of claims 9, 10 and 12, which depend from claim 8, should be withdrawn for at least the same reasons.

Claims 1-3, 5 and 14 stand rejected under 35 USC 103(a) as being unpatentable over Okazaki. This rejection is respectfully traversed. The Examiner admits that Okazaki fails to disclose a first electrode layer comprising Zr or Hf. Seeking to overcome this deficiency in the reference the Examiner states:

> [O]ne of ordinary skill in the art would have recognized that titanium (Ti), Zirconium (Zr) and Hafnium (Hf) are both considered to be an art recognized functional equivalent as an electrode layer for p-type nitride electrode, since they are all belong to same IVB group. Therefore, ti would have been obvious in the art at the time the invention was made to replace Ti layer with Zr or Hf layer to form electrode layer for p-type nitride semiconductor in order to form the electrode layer on the p-type nitride semiconductor.

The Federal Circuit has repeatedly stated that the Examiners can not rely on conclusory statements about what is common knowledge in the art. Examiners must provide documented authority to support their position. *See In Re Lee* 61 USPQ 2d 1430,

1435 (Fed. Cir. 2002) (" 'Common knowledge and common sense," even if assumed to derive from the agency's expertise, do not substitute for authority when the law requires authority."); *see also Zurko*, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001) ("[Deficiencies of the cited references cannot be remedied by the Boards general conclusions about what is 'basic knowledge' or 'common sense.' "). Accordingly, the Examiner must provide documented evidence that one of ordinary skill in the art would recognize that Zr and Hf are equivalent to Ti in the electrode structure disclosed by Okazaki.

Further, the Examiner's position that Ti is a function equivalent of Zr and Hf is incorrect. The Examiner argues that Ti is a functional equivalent of Zr and Hf because they all belong to the same IVB group. However, Zr and Hf have lower nitride formation energies than Ti. The formation energy (ΔG) of Ti nitride is -74 kcal/mol while the formation energies of Zr nitride and Hf nitride are –87 kcal/mol and –81 kcal/mol respectively. This means that Zr nitride and Hf nitride are more stable than Ti nitride.

As described in the specification, to obtain the desired ohmic characteristics, the metal of the first electrode layer should first form a nitride with nitrogen of the GaN semiconductor layer. Ga formed during this process preferably forms a compound with the metal of the second electrode layer (See the specification page 6, lines 15-27). If the metal nitride between the GaN layer and the first electrode layer is not stable, the stoichiometry is not maintained in the vicinity of the interface, which can lead to high resistance of the electrode structure. Therefore, Zr and Hf, which form more stable nitrides, are more preferred than Ti.

Since Okazaki does not describe or suggest the claimed first electrode layer, the rejection of claim 1 in view of Okazaki should be withdrawn. The rejection of claims 2,3 and 5, which depend from claim 1, should be withdrawn for at least the same reasons. Claim 14 has been cancelled, making the rejection of this claim moot.

Claims 4, 11 and 13 stand rejected under 35 USC 103(a) as being unpatentable over Okazaki in view of Kim. These three claims have been cancelled, making this rejection moot.

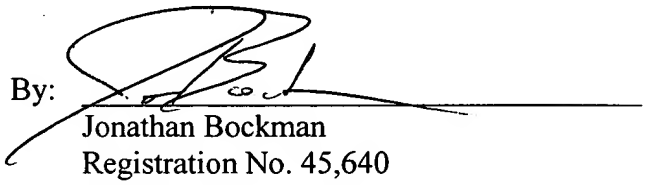
For the foregoing reasons, a notice of allowance allowing the pending claims in this application is solicited.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **245402001600.**

Respectfully submitted,

Dated: March 6, 2003

By: 

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Amend claim 8 as follows:

8. (Twice Amended) An electrode structure on a p-type III group nitride semiconductor layer, comprising first, second and third electrode layers successively stacked on said semiconductor layer,

said first electrode layer including at least one selected from a first metal group consisting of Ti, Hf, Zr, Nb, Ta and Sc,

said second electrode layer comprising ~~including at least one selected from a second metal group consisting of~~ Ni ~~and Co~~, and

said third electrode layer including Au.